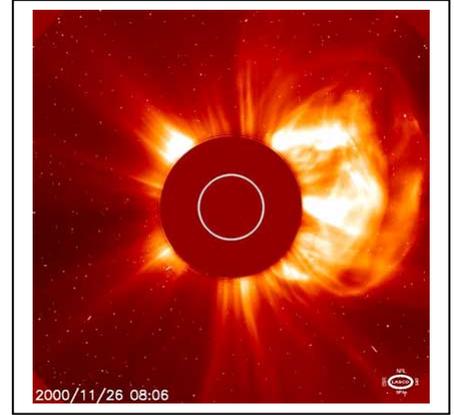


A Bird's-Eye Look at the Sun-Earth System

Solar flares are powerful releases of energy in the tangled **A_magnetic fields** of the sun, thousands of kilometers above certain sunspots. Within a few minutes, these **B_____** attempt to reconnect themselves into simpler shapes, releasing their stored energy. This energy heats the local **C_____** to millions of degrees, producing tremendous blasts of x-ray and gamma ray energy. Within 8.5 minutes, this **D_____** energy can reach Earth and disrupt the ionosphere. The **E_____** is the region of our atmosphere where radio waves can be reflected back to the ground so that we can send radio programs and messages around the world. But during **F_____**, radio broadcasting can be shut down for hours.

Scientists eventually discovered that, in addition to flares, discharges of plasma from the sun could also occur. With satellite sensors in space, they eventually caught sight of how the sun could from time to time release billions of tons of plasma traveling at millions of miles per hour. When these magnetized plasma clouds wash across Earth's magnetic field – called the **G_____**, these clouds can dump huge amounts of matter and energy into Earth's environment. **H_____** and magnetic storms are often the consequence of these **I_____**.

The entire Earth-Sun system follows a complicated give-and-take when severe solar **J_____** occur. Earth counteracts this onslaught of plasma and energy by a complex series of adjustments only available to it because it has a powerful magnetic field. With the magnetic field, most of the solar storm energy is diverted. What little enters the magnetosphere eventually finds its way into circulating **K_____** which return some, but not all of the magnetospheric plasma back to the solar wind – a constant stream of matter that leaves the solar surface. Solar storms cause Earth's magnetic field to be pulled into the shape of a **L_____**. The distant **M_____** can snap like pulled taffy as it attempts to relieve the magnetic stresses building up in the system. The released energy causes currents of **N_____** to flow into the upper atmosphere where they collide with atoms of oxygen and nitrogen to produce the spectacular displays of the Aurora Borealis and **O_____**.



Coronal Mass Ejection (CME) seen by SOHO satellite.

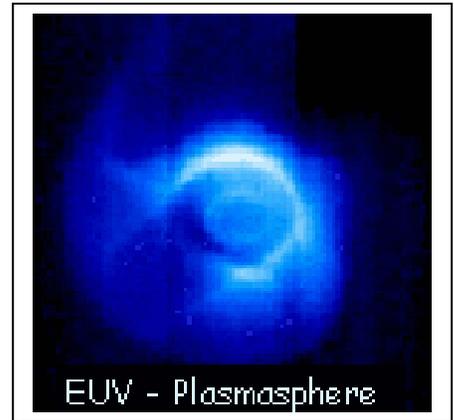


IMAGE sees Earth's upper atmosphere – the Plasmasphere.

-4 = Ring current	-9 = ionosphere	4 = electromagnetic
0 = Magnetotail	-3 = solar flares	10 = oxygen
3 = Plasma	8 = corona	1 = Coronal Mass Ejection
-7 = Sunspot	-1 = magnetosphere	-11 = stratosphere
2 = Aurora	11 = atmosphere	12 = plasmasphere
-10 = Ozone layer	6 = magnetic fields	5 = Aurora Australis
-6 = Comet	9 = sphere	-8 = photosphere
7 = Fields	-2 = storms	-5 = charged particles

Extra Credit Problem

10

Solve these equations for X to find the number in the Word Bank. Write the word on the indicated lettered line in the essay, then answer the questions below.

A $(x - 2) - 4 = 0$ **Answer: x= 6. From Word Bank 6 = 'magnetic fields'**

B $2(3-x) + 8 = 0$

C $8x - 2(2x - 4) + 4(4 - 3x) = 0$

D $-3x + 4 = 5x - 28$

E $-15 - 2x = 3(x + 10)$

F $4x - 4 - (3x - 4) + 3 = 0$

G $-(2x - 3) - (8 + 3x) = 0$

H $-(4x - 18) + 4(4 - 2x) - 2(3x-1) = 0$

I $-(3-4x) + 2(5-6x) - 6 = 3(2x - 5) - (x-3)$

J $-(2x + 8) + 6x = -16$

K $3(2x + 10) + 3x + 6 = 0$

L $-x + 3(2x - 5) + 3x = 2x - 51$

M $-x + 5 + (3x - 2) + 6 = 3(x + 3) - 2x$

N $-6(x+5) = 0$

O $5(x + 5) + 10(x - 3) = 70$

Question 1: Do the particles that cause aurora come from Earth's environment or directly from the Sun?

Question 2: What is a Coronal Mass Ejection?

Question 3: What roles do magnetic fields play in causing disturbances on the sun and Earth?

Question 4: Where does the energy come from to cause solar storms and aurora?

Question 5: How does Earth's magnetic field prevent solar storms from reaching the atmosphere?